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PERCEPTUAL INDISCRIMINABILITY: IN DEFENCE OF WRIGHT'S PROOF

By Rafael De Clercq and Leon Horsten

A series of unnoticeably small changes in an observable property may add up to a noticeable change. Crispin Wright has used this fact to prove that perceptual indiscriminability is a non-transitive relation. Delia Graff has recently argued that there is a 'tension' between Wright's assumptions. But Graff has misunderstood one of these, that 'phenomenal continua' are possible; and the other, that our powers of discrimination are finite, is sound. If the first assumption is properly understood, it is not in tension with but is actually implied by the second, given a plausible physical assumption.

Perceptual indiscriminability is non-transitive if it is possible to have three items x, y, z such that x looks the same as y, y looks the same as z, but x does not look the same as z. It is common to accept the non-transitivity of perceptual indiscriminability on the ground that we can imagine a process of gradual change in which a series of unnoticeably small changes finally add up to a noticeable change (in respect of a given quality). Crispin Wright has shown how the conceivability of such a process allows us to *prove* that perceptual indiscriminability is non-transitive.[1] However, more recently, in 'Phenomenal Continua and the Sorites' Delia Graff has argued that there is a tension between the assumptions upon which Wright's proof rests.[2] Moreover, she thinks that the conclusion of Wright's proof should be rejected in any case, because it threatens to deprive looks of their phenomenal nature. In this paper we argue that Graff has misunderstood Wright's assumption that 'phenomenal continua' are possible; and that his other assumption, *viz* that our powers of discrimination are finite, is sound. What is more, if the notion of phenomenal continuity is interpreted as intended, then it follows from the finiteness of our powers of discrimination that phenomenal continua are possible. At that point, we shall argue, the conclusion of Wright's argument becomes inescapable.

I

Wright (pp. 345–6) presents his proof as a *reductio* showing that the non-transitivity of indiscriminability follows from the possibility of phenomenal continua. To set it out

[1] C.J.G. Wright, 'On the Coherence of Vague Predicates', *Synthese*, 30 (1975), pp. 325–65.
[2] D. Graff, 'Phenomenal Continua and the Sorites', *Mind*, 110 (2001), pp. 905–35.

in a way close to Graff's (pp. 929–31), the argument goes as follows. Suppose that indiscriminability is transitive. Then consider a process of change in respect of some observable property (a determinable such as colour, position or pitch). The process is composed of stages between which there are no seemingly abrupt transitions, and is non-recurrent, in that for two distinct stages x and y, with x preceding y, there is no later stage z such that z is more like x (in respect of the observable property) than y is. Take any two stages D_i and D_j such that D_j is discriminable from D_i, and yet close enough to it to guarantee that all stages lying in between are either indiscriminable from D_i or indiscriminable from D_j. In other words, the intermediate stages will appear to have the same determinate of the determinable as one or other of the two surrounding stages (e.g., the same shade of colour). They cannot be indiscriminable from both D_i and D_j, since *being indiscriminable from* is supposed to be a transitive relation. As a result, the region between D_i and D_j will divide into two adjacent subregions, one consisting of stages indiscriminable from D_i, and the other consisting of stages indiscriminable from D_j. Since indiscriminability is supposed to be transitive and since D_i is discriminable from D_j, any stage belonging to the first subregion will likewise be discriminable from any stage belonging to the second subregion. However, if this is true, then contrary to what we have been assuming, a seemingly abrupt change must occur between D_i and D_j.

In this proof Wright is relying on two assumptions: the possibility of phenomenal continua, and the finiteness of human discriminatory powers (Graff, p. 931). The first assumption is needed to deny the existence of a seemingly abrupt transition from one stage to another. The second assumption allows for perceptually indiscriminable stages in the process. According to Graff (p. 931), these two assumptions 'are, taken individually, not implausible [but] they are in so much tension with each other that it is utterly unreasonable to accept them jointly when neither has anything remotely like adequate support'.

II

At first sight it seems that the notion of a phenomenal continuum is used in an informal manner in Wright's paper. By a 'continuous' change in a phenomenal quality he seems to mean little more than a 'perfectly smooth' or non-abrupt change (p. 345). Nevertheless Graff's paper provides us with a formal statement of a condition which, she believes, has to hold if a change in an object is to appear as continuous. More specifically, the condition is stated in the following two ways, which Graff says (p. 931) are equivalent :

1′. If *o* appears to change in respect of *q* over an interval, then it must appear to change in respect of *q* by some lesser amount over some proper part of that interval

2′. It appears to be the case that between every two positions *o* occupies in respect of *q*, there is a third position which *o* at some time occupies.

This necessary condition for *phenomenally* continuous change is derived from what Graff takes to be a condition for *objectively* continuous change. For instance, the objective non-phenomenal version of (1′) reads as follows:

1. If *o* changes in respect of *q* over an interval, then it must change in respect of *q* by some lesser amount over some proper part of that interval.

Clearly the difference between (1) and (1′) consists in the prefix of the operator 'it appears that' to the propositions constituting (1), and similarly for (2) and (2′).

The core problem is supposed to be that the condition stated by (1′) and (2′) seems difficult to square with another assumption of Wright's, namely, the assumption that our discriminatory powers are finite, or, in other words (p. 346), that we cannot 'always discern some distinction more minute than any discerned so far'. Graff (p. 930) puts this further assumption as follows:

(b) For some sufficiently slight amount of change (in respect of a certain quality) we cannot perceive an object as having changed by less than that amount unless we perceive it as not having changed at all.

Less formally, what (b) says is that there 'is a limit to how slight an apparent change can be' (p. 917). In other words, perceptual experience can only represent changes of more than a certain amount. However, if this assumption is correct, and there is a lower bound on the amount of change we can represent in perceptual experience, then how can it *appear* to us that, as (2′) says, between every two qualitatively distinct stages of a process there is a third one, differing qualitatively from both? Graff is surely right in discerning a tension here.

Yet things are not that simple. If with the above considerations in mind one returns to Wright's proof (as this has been stated in §I) then it seems that Graff may have taken the term 'phenomenal continuum' too mathematically. By deriving its meaning from the mathematical notion of a continuum (pp. 924–5), she seems to have overlooked its intended meaning. Indeed, it seems to us that the relevant notion of a phenomenal continuum, the notion figuring in Wright's proof, is to be understood in phenomenal terms from the start, e.g., in terms of 'being perceptually indiscriminable', or 'looking the same', or 'looking homogeneous', or in terms of 'there being no appearance of an abrupt change' (cf. Wright, p. 345). Roughly speaking, it seems that a process of change is phenomenally continuous for Wright if subsequent stages are perceptually indiscriminable from one another, in other words, if subsequent stages look the same in respect of a certain quality (at least when a subject is exposed to them in the original order).

III

So the key to our case is the idea that phenomenal continuity does not have to be understood in Graff's *quasi*-mathematical sense in order for Wright's argument to go through. Reduced to its essentials, the argument is simple. Apart from a plausible *physical* assumption, the finiteness of our powers of discrimination is all it needs.

Let there be given an observable physical quantity q, whose value can be expressed as a real number. (Thus the quantity q can be regarded as a determinable with specific values as determinates.) And assume the ***physical continuity assumption***, that the value of q varies through time according to some smooth continuous function (in the *mathematical* sense of the word). Let r_i refer to the value of quantity q at time i (r_i and $i \in \mathbb{R}$). Now we assume *finite discriminability*, in the sense that (i) there are r_a, r_b such that a given subject is able to discriminate between them; and (ii) there is a $d \in \mathbb{R}$ such that if $|r_i - r_j| < d$, then the subject is unable to discriminate perceptually between q at i and q at j. Now consider a finite chain $r_a = r_0, r_1, ..., r_n = r_b$, such that for each r_i in the chain, $|r_{i+1} - r_i| < d$. The foregoing assumptions entail that such a chain exists. Moreover, finite discriminability entails that a subject perceiving the chain will not notice 'an abrupt change', which means that the change in q will be perceived as continuous in Wright's (phenomenal) sense. Elementary mathematical considerations show immediately that this chain must contain a violation of transitivity of indiscriminability. After all, since each element in the chain is indiscriminable from the next with respect to q, transitivity would imply that the first element is indiscriminable from the last. However, by assumption, r_a is discriminable from r_b with respect to q.

The elementary mathematical considerations to which we appeal in the final step of the proof can be written out as follows. We want to show that for all chains $r_1, ..., r_n$ of finite length n, if for each $1 \leq i \leq n-1$, r_i is indistinguishable from r_{i+1}, and r_1 is distinguishable from r_n, then the distinguishability relation on the chain is not transitive. For $n < 3$, the property trivially holds. We show by mathematical induction on the length of chains that the property also holds for lengths $n \geq 3$. As an induction hypothesis, assume that the property holds for all chains of length n. We consider any chain $r_1, ..., r_n, r_{n+1}$ of length $n+1$. By assumption we have r_1 distinguishable from r_{n+1}, but for each $1 \leq i \leq n$, r_i is indistinguishable from r_{i+1}. Now there are two possibilities: (i) r_i is distinguishable from r_1; (ii) r_i is indistinguishable from r_1. In case (i), we have by the inductive hypothesis that there is a violation of transitivity of indistinguishability in the initial segment $r_1, ..., r_n$, so in that case we are done. In case (ii), r_1 is indistinguishable from r_n, and, by assumption, r_n from r_{n+1} while, also by assumption, r_1 is distinguishable from r_{n+1}. Again this is a violation of transitivity, so in that case we are also done.

It has already been pointed out that Graff recognizes the validity of Wright's argument. According to her, 'Wright's reasoning is impeccable'. Her complaint is, rather, that there is a *tension* between the assumptions figuring in his proof, *viz* the assumption that phenomenal continua are possible and the assumption that human discriminatory powers are finite. However, as we have just seen, there is no tension if the first assumption is properly conceived, since, on that condition, the first premise *follows from* the second premise in conjunction with the physical continuity assumption.

In fact, if we were to accept Graff's own rendering of the first assumption – which, for reasons explained earlier, we do not – then there would be a *contradiction*, not just a tension. Consider, for example, the condition for phenomenally continuous change as stated by (1′):

1′. If *o* appears to change in respect of *q* over an interval, then it must appear to change in respect of *q* by some lesser amount over some proper part of that interval.

('Appears' is to be understood here in perceptual terms, e.g., as 'visually appears'. Also, since we are concerned with 'change', it may be assumed that the amount in question is a non-zero amount.) (1′) seems to imply that an object cannot undergo *any* apparent change in colour unless it first undergoes *some smaller* apparent change in colour, which implies that in a limited time-interval there can be an infinite number of apparent changes. But if there can be an infinite number of apparent changes in a limited time-interval, then our discriminatory powers must be infinite in the sense of (b): there must be no limit 'to how slight an apparent change can be' (Graff, pp. 917–18). Thus an outright contradiction results if we accept (1′) as a viable interpretation of the term 'phenomenal continuum'.

In fairness to Graff, it must be admitted (see p. 931) that she is aware of the fact that her definition of phenomenal continuity is the only hypothetical element in her argumentation against the conjunction of Wright's premises. But we see this merely as support for the claim that in Wright's argument, a different concept of phenomenal continuity must have been in play.

IV

So everything rests on the assumption of finite discriminability. Graff does not find this assumption evident. In her discussion of the phenomenon of 'slow motion', she writes (p. 928):

> ... we have two competing explanations of what is going on when the hour-hand of a clock looks to have moved over some long [time] interval, but also seems to have looked still during every sufficiently short subinterval. The first explanation is that when we judge the hour-hand to look still, say for every twenty-second period, it does in fact look to be in the same position at the end of each period as at the start. The alternative explanation is that when we judge the hour-hand to look still, although there is at least one twenty-second period for which it does not look in the same position at the end as at the start, we do not notice this. *Noticing* the change in an apparent position requires not only that there be an apparent change, but also that we believe there to be one.

In other words, according to one explanation of what happens when the hour-hand of a clock moves unnoticeably, there is no apparent change because there does not appear to be a change: at least at a conscious level, things look exactly the same before and after the change. This explanation seems plausible enough. However, Graff's sympathy lies with the other explanation: the apparent position of the hour-hand of a clock – the position it appears to have – changes constantly, i.e., even within time intervals that are so short that we are unable to tell ('notice') whether there has been a change. But this seems to be absurd, for it entails that we have no direct epistemic access to whether, at a given moment, two things look the same to us in some respect or not.

Elsewhere in her paper, Graff argues that accepting the non-transitivity of 'looking the same as' does insufficient justice to the phenomenal character of looks (p. 932). After all, if 'looking the same as' is transitive, then looks can simply be taken to be equivalence-classes of the relation; and if 'looking the same as' is non-transitive, then one must either maintain that there are things which look the same (in some respect) but nevertheless do not have the same look, or that there are things which look different but have the same look.

However, as is clear from the discussion of the quotation above, if Graff wants to reject Wright's assumption that human discriminatory powers are finite, then she too is ultimately committed to spreading an epistemic veil, not directly over 'looks', but over the underlying phenomenal relation 'looking the same as'. After all, by claiming that to every change in an observable property (e.g., the position of the hour-hand of a clock) there corresponds an *apparent but not necessarily noticeable* change, Graff drives a wedge between what looks the same (to us) and what we know to look the same (to us).

Finally, as Graff herself notes in passing (p. 916, fn. 13), there remains also the option of giving up looks altogether.

University of Leuven[3]

[3] The first author is a Postdoctoral Fellow of the Fund for Scientific Research, Flanders.